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ABSTRACT

This paper describes the development of a middle childhood level (MCL) teacher preparation program under Ohio licensure requirements. Wright State University developed an undergraduate degree in Middle Childhood Education with extensive content preparation and middle school field experiences. After graduation, students enter a graduate program where they are fully immersed in middle school environments. The program is designed to prepare highly qualified middle grades educators skilled in promoting learning among young adolescents. The future MCL educators first complete the undergraduate program in two specialized areas (language arts, social studies, mathematics, and/or science) accompanied by 15 hours of teacher education professional coursework and field experiences in urban and suburban practicums in MCL school settings. Classes provide undergraduates with an introduction to the total ecology of schools with a focus on MCL education. The post-baccalaureate Professional Educators Program provides MCL educators with licensure. The program includes a year-long MCL internship during which interns develop knowledge, dispositions, and performances aligned with National Middle School Association and other appropriate learned society standards in addition to the four Pathwise/Praxis domains and 19 assessment criteria. (SM)

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Preparing Middle School Teachers: What Does a Licensure Program Look Like?

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Paper presented at the Ohio Middle School Association conference,
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Presentation Description

Title: Preparing Middle School Teachers: What does a Licensure Program look like?

Goal: (list in one clear sentence the goal of your session)

This session will describe and clarify development of a Middle Level Teacher Preparation Program under Ohio Licensure Requirements.

Abstract: (provide a short description of your presentation. This will be printed in the program.)

Teacher preparations programs have spent the last several years wrestling with meeting the new Ohio requirements for Middle Childhood Level Licensure. This has been challenging for many reasons including the need to prepare preservice teachers in two content areas while providing substantial initiation middle school culture. At Wright State University, we have developed an undergraduate degree in Middle Childhood Education with extensive content preparation and middle school field experiences. Our students then enter a graduate program where they are fully immersed in middle school environments. This session will describe our program and solicit feedback from middle level educators in the trenches.

Abstract:
Teacher preparations programs have spent the last several years wrestling with meeting the new Ohio requirements for Middle Childhood Level Licensure. This has been challenging for many reasons including the need to prepare preservice teachers in two content areas while providing substantial initiation middle school culture. At Wright State University, we have developed an undergraduate degree in Middle Childhood Education with extensive content preparation and middle school field experiences. Our students then enter a graduate program where they are fully immersed in middle school environments.

Middle Childhood Level Program
Program Description

The Purpose of Wright State University's Middle Childhood Level Program is to prepare highly qualified middle grade educators skilled in promoting learning in young adolescents. These future Middle Childhood Level educators first complete a rigorous undergraduate program in two specialized areas (Language Arts, Social Studies, Mathematics or Science) accompanied with 15 hours of Teacher Education Professional coursework and field experiences in urban and suburban practicum experiences in Middle Childhood Level school settings. The Teacher Education Professional Phase I classes, provide the undergraduate with an introduction to the total ecology of schools with a focus on Middle Childhood Level education.

The post-baccalaureate Professional Educators Program (PEP) is designed to provide Middle Childhood Level educators with licensure. Incoming non-WSU graduate students take courses comparable to the Phase I learning experiences described above during Summer A term. Starting Summer B term, all PEP students complete the program taking specifically developed coursework as well as a year long Middle Childhood Level internship. Interns develop knowledge, dispositions and performances aligned with Pathwise/PRAXIS four domains and 19 criteria. The interns' teaching preparedness and proficiency is documented in a Middle Childhood Level Professional Educator's Electronic Portfolio.

Candidate Course of Studies with Required Courses Indicated
Preparation for Middle Childhood Level Licensure

Bachelors Degree Program Requirements*

***Students entering the program with an Undergraduate Degree will have transcripts evaluated to determine if courses are roughly equivalent to required WSU teacher preparation course work.**

MIDDLE CHILDHOOD LEVEL
Undergraduate Pre-Professional Program

Middle Childhood Level BS Ed. Degree Without Licensure

Listing of the general education, foundation curriculum and discipline area concentration course requirements for the bachelors degree follows.

GENERAL EDUCATION REQUIREMENTS			46 qtr cr hr
AREA I:	ENG 101-102	Freshman Composition	8
	MTH 143	Quantitative Reasoning	4
AREA II:	HST 101, 102, 103	Western World	9
	ENG 204	Great Books of the Western World	3
	ART/MUS/TH 214	Fine and Performing Arts (choose one)	3
AREA III:	CST 230	Comparative Studies Non-Western Literature	3
	RST 260***-290	Regional Studies (Non-Western)	3
AREA IV:	PSY 105	Psychology	4
SOC/PLS/EC 200	Social, Political, Economic Life		9
Natural Sciences* (listed below)			

FOUNDATION CURRICULUM CONTENT		76 qtr cr hr
COM 103	Communication for Teachers	3
COM 152	Mass Communication**	3
SM 145	Foundations in Scientific Literacy and Problem Solving	3
PHY 245	Concepts in Physics*	4.5
CHM 245	Concepts in Chemistry*	4.5
BIO 345	Concepts in Biology*	4.5
GL 345	Concepts in Geology*	4.5
ENG 340	Language for Teachers	4
ENG 342	Advanced Composition for Teachers	3
GEO 201 or 202 or 203	Principles of Physical/Cultural/Economic Geography	3
HPR 281	Physical Education for the Middle Childhood Level	4
HED 331	Personal Health for Educators	4
HPR 260	First Aid	3
HST 211 & 212	American Civilization	6
MTH 243 & 244	Fundamentals of Mathematics I and II	8
EDT 280	Classroom Applications of Computer-Based Technology	3
MUS 365	Methods and Materials for Teaching General Music**	4
AED 431	Art and the Child**	4
ED 421	Literature for Middle Childhood **	3

*Meets general education requirements for Middle Childhood Level education students
** or appropriate course substitution
*** Social Studies concentration requires students to select RST 260

Subject Area Concentration (Choose Two of the Four) (Total 49-52 hrs.)

English/Language Arts Concentration: (In addition to 17-27 hrs. above)		(26)
ENG 303	Short Story Writing	4
or/ENG 330	Business Writing	
or/ENG 344	Research Writing	
ENG 211	Introduction to Fiction	3
ENG 355	American Texts: Earlier 19th Century (choose two)	8
&/or/ENG 356	American Texts: Later 19th Century	
&/or/ENG 357	American Texts: 20th Century	
ENG 482	Grammatical Structures of English	4
ENG 205	Afro-American Literature	3
COM 365	Issues in Mass Communication**	4

**or appropriate course substitution

Social Studies: (In addition to 15 hrs. above)	(25)
HST 218 or 219 Ohio history coursework	3
HST 214 or 215 African-American history	3
HST 470 or 475 or 480 or 485 U.S. history	4
HST 445 or 455 or 465 non-Western History	4
PLS 212 or 222 or 322 or 331 or 340 or 351 or 371 Government	4
GEO 149 or 201 or 202 or 203 Map Study or Geography	3
plus any 4 or more additional hours from the following: GEO 325 or 370	4

or 375 or EC 201 or 202 or 203; or other appropriate history, and/or social studies course.

Mathematics: (In addition to the 12 hours above)		(24)
MTH 343	Algebra and Functions	4
MTH 344	Problem Solving	4
MTH 345	Geometry	4
MTH 348	Concepts in Calculus	4
MTH 446	Math. Modeling	4
STT 342	Probability and Statistics	4

Science: (In addition to 21 hrs. above) (346 Science courses being developed (26)

Students need to take 4 hours in each discipline. When possible students must take the courses designated for middle level science plus SM 445 and appropriate elective.

Chemistry	CHM 346	Concepts in Chemistry II	4.5
Physics	PHY 346	Concepts/Applications in Physics II	4.5
Biology	BIO 346	Concepts in Biology II	4.5
Geology	GL 346	Concepts in Geology II	4.5
	SM 445	Projects in Science	6

Pre-Professional Education **15 hrs.**

ED 301 Schooling in a Pluralistic Society: The Middle Childhood Level Perspective	(5)
ED 221 Practicum I - (in Middle Childhood Level)	(1)
ED 303 Intro to Psychological Foundations of Educ: The Middle Level Learner	(5)
ED 223 Practicum II- (in Middle Childhood Level)	(1)
EDS 333 Learning Differences: Introduction	(3)

TOTAL UNDERGRADUATE DEGREE WITHOUT LICENSURE **T = 186 - 189 HRS.

(* *This degree meets the new requirements for TWO areas of concentration and 8 hours of the new mandated emphasis on phonics/reading. The remaining hours of the mandate will be taken during the Licensure work at the graduate level following completion of this degree.

Middle Childhood Graduate Level – Professional Educators Program (PEP)

Course Credit Assignments
4/14/99 Approved by the Teacher Education Department – revised 8/07/00

Phase One

Term 1*

ED 602	(4)	Education In a Pluralistic Society: Middle Childhood Perspective
ED 621	(4)	Human Development and Learning: Middle Childhood Perspective
EDS 624	(3)	Addressing Learning Differences
ED 612	(1)	Practicum I: Middle Childhood Level
Total hours:	12	

* Courses needed if not taken as an undergraduate

Phase Two

Term 2

ED 645	(3)	Inquiry & Assessment: Middle Childhood Level
ED 622	(3)	Technological Instruction & Integrated Methods: Middle Level
ED 732	(3)	Principles and Practices of Middle Childhood Level Education
Total hours:	9	

Term 3

ED 600	(3)	Classroom Management: Middle Childhood Level
ED 606	(4.5)	Reading & Literacy Instruction I: Middle Childhood Level
ED 709	(4.5)	Diagnosis & Assessment of Reading Performance
ED 614	(1)	Practicum II: Middle Childhood Level
Total hours:	13	

Term 4

ED 607	(4.5)	Reading & Literacy Instruction II: Middle Level
ED 717	(4.5)	Word Study: Phonics Middle Level
ED 616	(1)	Practicum III: Middle Childhood Level

Plus Methods Courses - Choose 2

ED 636	(3)	Integrated Middle Childhood Level Science Methods &/or
ED 610	(3)	Middle Childhood Mathematics Methods
ED 624	(3)	Middle Childhood Literature, Speech, and Drama &/or
ED 629	(3)	Middle School Social Studies Methods (3 X 2) = 6 hrs.
Total hours:	16	

Phase Three

Term 5

ED 641-12- Internship: Middle Childhood Level Student Teaching
Total hours: 12

50-62 Graduate Hours to Receive Licensure
To complete M. Ed.:
ED 646-3-Inquiry and Prospectus
ED 771-1-Inquiry Project Completion

Total M. Ed. Program Hours if Graduate Phase I is needed = 64
Total M. Ed. Program Hours if Graduate Phase I is not needed = 52

Knowledge Base
for
Middle Childhood Level Licensure

Statement of Philosophy, Rationale and Program Goals with Supporting Knowledge Base For Middle Childhood Level

The Purpose of Wright State University's (WSU) Middle Childhood Level (MCL) Program is to prepare highly qualified middle grade educators skilled in guiding and motivating in young adolescents to learn. These future MCL educators first complete a rigorous undergraduate program in two specialized areas (Language Arts, Social Studies, Mathematics and/or Science) accompanied by 15 hours of Teacher Education Professional coursework and field experiences in urban and suburban practicum experiences in MCL school settings. The Teacher Education Professional Phase I classes, provide the undergraduate with an introduction to the total ecology of schools with a focus on MCL education.

The post-baccalaureate Professional Educators Program (PEP) is designed to provide MCL educators with licensure. Incoming non-WSU graduate students take courses comparable to the Phase I learning experiences described above during Summer A term. Starting Summer B term, all PEP students complete the program taking specifically developed coursework as well as a year long MCL internship. Interns develop knowledge, dispositions and performances aligned with National Middle School Association (NMSA) and other appropriate learned society standards in addition to the four Pathwise/PRAXIS domains and 19 assessment criteria. The interns' teaching preparedness and proficiency is documented in a MCL Professional Educator's Portfolio.

The professional literature in education provides the underlying philosophy and rationale for WSU's MCL teacher preparation program. The knowledge base from MNSA and other associated organizations indicates that MCL, a significant and complicated developmental age, must have teachers who are appropriately prepared and knowledgeable in both content and working with young adolescents.

Students in the MCL years experience maturation and unique growth needs, which must be addressed in the middle school setting to ensure student success. The following summary of the NMSA position paper, *This We Believe*, (1995) is the underlying philosophy of the WSU Middle Childhood Level Teacher Preparation Program:

- Young people undergo...rapid and profound personal changes from ages 10-15.
- Early Adolescence is a period of tremendous variability among youngsters of the same gender and chronological age.
- Growth is common in all areas of development - intellectual, physical, social, emotional and moral...individual differences proliferate.
- Young adolescents reveal growing capacity for conceptualization for considering more than a single idea at a time, and for planing steps to carry out their own learning.
- Students benefits from learning systematic approaches to creative thinking and problem solving.
- However, because cognitive growth occurs gradually, most Middle Childhood Level students require ongoing concrete, experiential learning in order to develop intellectually.
- Concerns about appearance and body changes usually generate heightened interest in personal grooming.
- Their health practices are often inappropriate, especially in meeting the nutritional needs of changing bodies.
- Young adolescents search for personal identity.

NMSA also states that developmentally appropriate middle schools promote programs that actively assist young people in formulating the moral principles upon which they may ground their lives. Likewise, the primary goal MCL programs should be a commitment to young adolescents. At WSU this MCL teacher preparation program goals: embrace a shared united vision and middle school philosophy; set high expectations for all; serve as adult advocates for their students; foster family and community partnerships; have flexible organization; have policies that foster health, wellness and safety; insure comprehensive guidance and support services for all students; and ensure a positive climate for learning. In addition, the curriculum within the school should be challenging, integrative and exploratory. Teachers are prepared to vary teaching and learning experiences as appropriate as well as use assessment and evaluate strategies that promote young adolescents' learning.

The second respected organization that built their Middle Childhood Level philosophy on empirical documentation, the Carnegie Council on Adolescent Development (1990), summarized that MCL Education should:

- Create a community for learning.
- Teach a core of common knowledge (critical thinking and healthy lifestyles).
- Young adolescents must be healthy to learn.
- Ensure success for all students (cooperative learning not tracking).
- Families and Middle Schools must be allied through trust and respect.
- Responsibility for Middle Childhood Level student success should be shared between schools and community.
- Provide flexible scheduling (Blocks of time, joint planning by teachers).
- Empower teachers and administrators.

The third source for this knowledge base is Stevensen (1991) who concludes from Caweli's study for the American Society for Curriculum Development (ASCD) that positive Middle Schools use teacher-advisor format, provides transitions and articulates activities, use interdisciplinary teaching and activities and continually expose teachers to teaching strategies appropriate to adolescent students. In 1992, ASCD synthesized research on student desires for MCL teachers. Young adolescent students desired teachers:

- Who can be respected and someone they can believe in.
- Who are fair and trust-worthy.
- Who create psychological safety.
- Who have a sense of humor.
- Who listen to students perceptions, interpretations and concerns.
- Who are willing to negotiate without abdicating appropriate authority.
- Who communicates humanly and rationally.
- Who clarify where the line is drawn and the consequences for violations. Valuing order and consistency.

WSU's MCL program is designed to educate future MCL educators about the philosophical underpinnings as well as place them in Middle Schools exemplifying these principles. We likewise believe that WSU's Teacher Education Department must work with the MCL Professional Development Schools to guarantee actualization of the principles. Thus the Middle Childhood Level Program centers on:

- A dual specialized liberal arts undergraduate education.
- A strong psychological and sociological understanding of adolescents to best serve the needs of Middle Childhood Level students insuring these young people an opportunity to develop respect for diversity and an awareness of the changing American Society.
- In-depth involvement in Middle School environments, including rich experiences with appropriate MCL curriculum and instructional methodologies.
- Integrated and specialized methods coursework as well as a strong exposure to reading methodology.

• An undergraduate exposure to schooling and an intense graduate practicum in MCL Professional Development Schools.
• An understanding and ability to effectively use technology.
• A respect for and desire to inquiry and research to sustain success in renewal and reform.

References

Carnegie Council on Adolescent Development. (1990). Turning points: Preparing American youth for the 21st century. Washington, D.C.: Carnegie Corp.

George, P. S., C. Stevenson, J. Thomason and J. Beane. (1992). Middle level and beyond. Washington, D.C.: ASCD, 1992.

McEwin, C. K. and T. S. Dickinson, T. O. Erb and P. C. Scales. (1995). A vision of excellence, organizing principles for middle grades teacher preparation. Columbus, Ohio: Center or Early Adolescence and National Middle Childhood Level Association.

McEwin, C. K. and T. S. Dickinson. (1995). Professional preparation of middle level teachers: Profiles of successful programs. Columbus: Ohio NMSA.

National Middle Childhood Level Association. (1996), NMSA research summary #5. Columbus, Ohio: NMSA.

National Middle Childhood Level Association. (1995). This we believe: Developmentally responsive middle level schools. Columbus, Ohio: NMSA.

Programs for the preparation of middle childhood teachers must include:
State Mandated Reading Requirement
Minimum (6 semester hours):
Phonics (3 semester hours):
select from: Reading Instruction; Diagnosis and Assessment; Content Area Reading (3 semester hours minimum)

Complete (12 Semester hours):
Phonics (3 semester hours)
select from: Reading Instruction; Diagnosis and Assessment; Content Area Reading (9 Semester hours minimum)

1 **Identifiable Program**
An identifiable program is established for prospective middle level teachers

1.1 A written conceptual framework makes explicit the underlying professional commitments, dispositions, and values upon which the program is based. A statement of philosophy and goals, associated rationale for coursework and field experiences, and a description of program evaluation are included.

1.2 The program contains knowledge, pedagogy, and field experiences designed especially for teaching at the middle level.

2 **Nature of Early Adolescence and Needs of Young Adolescents**
The program prepares professionals who

understand:

2.1 The physical, social, emotional, intellectual, and moral characteristics of the developmental period of early adolescence within social and cultural contexts.
2.2 The changes in family settings, social contexts, threats to health and safety, and risk behaviors in contemporary society that affect healthy development of young adolescents.

3 **Young Adolescent Development in the School Context**

The program prepares professionals who apply their knowledge of the nature of early adolescence and needs of young adolescents to:

3.1 Plan developmentally and culturally responsive instruction.
3.2 Design appropriate school programs and function within them.
3.3 Create supportive school environments

4 **Philosophy and School Organization**

The program prepares professionals who understand the rationale for, the role of teachers in, and the function of:

- 4.1 Interdisciplinary Teams.
- 4.2 Teacher-based guidance programs

4.3 Flexible grouping and scheduling arrangements
4.4 4.4 Activity programs
4.5 Working with colleagues within the framework
- of the entire school community.

4.6 Working with families, resource persons, and community groups.

5 **Curriculum, Pedagogy, and Assessment**

The program prepares professionals who design and employ teaching and learning approaches appropriate for young adolescents which:

5.1 Honor individual differences among learners by utilizing multiple approaches to thinking and learning.
5.2 Incorporate learners' ideas, interests, and questions into the exploration of curriculum and pursuit of knowledge.
5.3 Emphasize the interdisciplinary nature of knowledge while drawing upon the resources
- inherent in separate subjects.

5.4 Teach the basic concepts and skills of inquiry and communication as integral to all learning.
5.5 Cultivate skills in recognizing and solving problems.
5.6 Utilize multiple grouping strategies that emphasize interdependence, cooperation, and individual responsibilities.
5.7 Employ accountability measures that balance evaluation of academic learning with assessment of individual growth and development.
5.8 Include multiple strategies for evaluation and assessment.

6 **Collaboration**

The program prepares professionals who collaborate with:

6.1 Colleagues to improve schools and advance knowledge and practice in their fields.
6.2 Families, resource persons, and community groups to achieve common goals for young adolescents.

7 Teaching Fields and Pedagogy
The program includes:
7.1 Preparation in two teaching fields which are broad, multidisciplinary, an encompass the major areas within those fields.

8 Field Experiences
Field experiences in grades 5-8 will provide:

8.1 Early and continuing involvement in a variety of middle level settings.
8.2 8.2 Observation, participation, and teaching experiences ranging from individual to large group settings.
8.3 Full-time students teaching of at least 10 weeks, supervised by a qualified teacher and a university / college supervisor.

Teacher Preparation Program Approval Standards for Programs Leading to the Middle Childhood License in Science

Professional development for teachers of science is based on a vision of teaching and learning in which all students have the opportunity to become scientifically literate. For a teacher of science, professional development is a continuous, lifelong process. The formal teacher preparation program for a teacher of science is a critical phase of this process that provides the basis of the teacher's understanding of the nature of science and science teaching. This understanding must be based on theory and research as well as the ability to make sound instructional decisions. Because science learning builds on prior mental constructs and experiences, teachers must have opportunities to develop understandings of diverse students as individual learners and use this knowledge to shape decisions in the classroom that are age appropriate and address the unique abilities or characteristics of all learners. The program approval standards presented here provide criteria for the establishment of science teacher preparation programs in accord with this vision of science teaching and learning.

Approval of teacher education programs leading to the middle childhood license with a science concentration shall be based on evidence of courses and experiences designed to include the following:

1. Performance-based licensure requirements for beginning teachers

- Complete citation of evidence of courses and experiences designed to fulfill the guidelines of *NMSA/NCATE* approved *Basic Program for Middle Level Teachers.* (See Figure 1. Folio Completion Process)

2. Programs developed according to learned society guidelines
   - Complete citation of evidence of courses and/or experiences that fulfill guidelines 7.1 and 7.2 using *NCATE/NSTA Curriculum Guidelines.*
   - The program folio representing a middle level teacher preparation program with a science emphasis should provide evidence that the required program courses and/or experiences correlate to the modified (as indicated by italics)*NCATE/NSTA Curriculum Guidelines, Core Guidelines and Matrix, A. Preparation to Teach Science.*

3. Pre-kindergarten through twelfth grade education State Board standards and curriculum models (i.e., *Ohio's Model Competency-Based Science Program*).
   - Complete citation of evidence that the breadth of preservice students' knowledge base, organized by discipline and/or courses, includes a firm understanding of all five of *Ohio's Model Competency-Based Science Program Goals, 1.1 through 5.6.*
   - The 24 semester hours of content preparation, recommended by the learned society guidelines, in the science program folio, should be consistent with the *NCATE/NSTA Curriculum Guidelines, Core Guidelines and Matrix, B. Preparation in Science* (modified to correlate to *Ohio's Model Competency-Based Science Program* Goals).

Figure 1	Folio Completion Process: Flowchart Describing Learned Society Guidelines and State Board Substitutions.

NMSA
Curriculum Guidelines Handbook and Matrices

- 1.1. - 6.2
- 7. Teaching Fields and Pedagogy
  - 7.1
  - 7.2
  - 8.1 - 8.3

Complete NMSA Curriculum Guidelines 1.1 - 6.2. and 8.1 - 8.3

NCATE/NSTA
Curriculum Guidelines/Core Guidelines and Matrix

- *A. Preparation to Teach Science*
- *B. Preparation in Science*

Replace NMSA, *7.1 & 7.2* with modified NCATE /NSTA, *A. & B.*

State Board Curriculum Model
Ohio's Model Competency-Based Science Program Goals

Use modified NCATE/NSTA, *B.* with Ohio Science Model Goals, *1* throug

1. The Nature of Science□□□□*2. The Physical Setting*□□□□*3. The Living Environment*□□□□*4. Societal Perspectives*□□□□*5. Thematic Ideas*□□**Modified NCATE/NSTA Core Guidelines MatrixA. Preparation to Teach Science (*Modifications Indicated by Italics.*)**□□∑ Preparation to teach science should enable middle level teachers to:	**Directions:** In the left column, list courses and experiences that correlate with the guidelines
Guideline	**Courses and/or Experiences**
3.1 Provide all students with a holistic, interdisciplinary understanding of science, as well as to: Relate science to contemporary events, research results, and the students' daily lives. ∑ Integrate science with other middle level subjects	
3.2 Fulfill the professional and legal obligations of science teaching.	Sci. & Math. 445; ED 636
3.3 Establish and maintain safety in all areas related to science instruction, *including the use and care of materials and living organisms in an ethical and appropriate manner.*	
3.4 Provide experiences which will promote the use of science processes and problem-solving skills, including the use of: ∑ A variety of instructional strategies, curriculum materials, and equipment in an active (hands-on) learning	

environment. ∑ Electronic educational technology, including computers, interactive video, telecommunications, and others. ∑*Basic mathematical and computer-based tools in the scientific investigation of phenomena and the analysis of data.*	
3.5 Use techniques for assessing student outcomes (i.e., *Ohio Department of Education's Competency-Based Assessment Models for Science, including science portfolio*) which are aligned with *and/or embedded in* instruction and consistent with *identified state, national, and/or international* assessment goals (*i.e., Ohio Science Proficiency Tests, NAEP, and TIMSS*).	Ch 245, Phys 245, Bio 345, GL 345, Ch 346, Phys 346, Bio 346, GL 346, SM 145, & SM 445 ED 731
3.6 Plan and provide instruction that is based on prior knowledge and conceptualizations of the students and the application of current research findings on adolescent learning.	SM 445; ED 303; ED 645; ED 600 ED 636
3.7 Use effective classroom management techniques to establish and maintain *collegial discourse and* an environment conducive to *all students* learning science.	Field-based courses: SM 445 ED 636; and ED 622 ED 301, ED 321, 323; ED 612/614/616

Modified NCATE/NSTA Core Guideline Matrix B. Preparation in Science	
Directions: In the left column, under each *Ohio Science Model Goal*, list the specific Goals 1.1-5.6 (See p. 5) which represent the middle level teacher preparation in science developed in the courses and experiences on the right.	**Directions:** In the right column, list program courses and experiences (including semester hours).
Ohio Science Model Goals	**Courses and/or Experiences**
1. **The Nature of Science:** To enable students to understand and engage in scientific inquiry; to develop positive attitudes toward the scientific enterprise; and to make decisions that are evidence-based and reflect a thorough understanding of the interrelationships among science, technology, and society	Chem 245, Phys 245, Bio 345, GL 345, (1.1,1.2,1.3, 1.4,1.5,1.6) Ch 346, Phys 346, Bio 346, GL 346, (1.2, 1.3, 1.4) SM 145, & SM 445 (1.1, 1.2, 1.3, 1.4, 1.5, 1.6) ED 636 (1.4, 1.5, 1.6)
2. **The Physical Setting:** To enable students to describe the relationship between the physical universe and the living environment, and to reflect upon and be able to apply the principles on which the physical universe seems to run.	Chem 245, Phys 245, Bio 345, GL 345, & SM 445 (2.1,2.2, 2.3,2.4) Ch 346, Phys 346, & SM 145 (2.1,2.2,2.3) Bio 346, GL 346, (2.4 (2.3)
3. **The Living Environment:** To enable students to describe the relationship between the structure and functions of organisms, to assess how organisms interact with one another and the physical setting, and to make decisions that ensure a sustainable environment.	Bio 345, Bio 346 (3.1,3.2,3.3,3.4,3.5) GL 345, GL 346 (3.3,3.4) SM 445; GEO 375 (3.4,3.5)
4. **Societal Perspectives:** To enable students to analyze the interactions of science, technology and society, in the past, present and future.	SM 445; GEO 375; ED 636 (4.1,4.2,4.3,4.4)
5. **Thematic Ideas:** To enable students to use major scientific ideas to explore phenomena, inform their decisions, resolve issues, and solve problems; and to explain how things might work.	SM 145, Chem 245, Phys 245, (5.2,5.3,5.4,5.6) Chem 346 Phys 346 Bio 345, GL 345, (5.1,5.2,5.3,5.4,5.5,5.6) Bio 346, GL 346 and SM 445 ED 636; ED 622 (5.1 - 5.6 in a broad sense)

OHIO'S MODEL COMPETENCY-BASED SCIENCE PROGRAM GOALS

The following Goals are supported by grade-level objectives organized in four instructional strands. These Goals represent the culmination of science experiences and should be used as a filter for the consistency and development of an articulated science program.

GOAL 1. THE NATURE OF SCIENCE. To enable students to understand and engage in scientific inquiry; to develop positive attitudes toward the scientific enterprise; and to make decisions that are evidence-based and reflect a thorough understanding of the interrelationships among science, technology, and society.

As a result of a successful science education, the learner will:

1.1. demonstrate curiosity, open-mindedness, skepticism, and ethical behavior while participating in scientific inquiry;

1.2. develop and use scientific skills and concepts to explore how the natural world works and to examine and propose solutions for its problems;

1.3. formulate questions, hypotheses, and models drawing upon appropriate means, including logic and imagination, and design investigations to test them;

1.4. choose and use appropriate means for making observations, gathering evidence, presenting the evidence in appropriate formats, performing analyses, drawing inferences, and formulating conclusions; and use them to initiate additional investigations and applications;

1.5. recognize that scientific knowledge is always open to refinement and can never be declared absolutely certain as demonstrated by the capacity and willingness to modify personal insights and understandings in light of additional evidence; and

1.6. engage in personal and group decision-making, using risk-benefit analysis, about the use of technology to solve problems of human adaption.

GOAL 2. THE PHYSICAL SETTING. To enable students to describe the relationship between the physical universe and the living environment, and to reflect upon and be able to apply the principles on which the physical universe seems to run.

As a result of a successful science education, the learner will:

2.1. investigate and distinguish among the various macro and micro components, of the universe; explain how they relate to one another; and elaborate on how humans have arrived at their understandings of the universe;

2.2. explore and explain the fundamental principles governing relationships between and among matter, energy, space, and time;

2.3. construct and interpret conceptual, physical, and mathematical models to explain the motions of the earth and the materials and systems that compose it; and

2.4. make and act upon evidence-based decisions to ensure a sustainable environment.

GOAL 3. THE LIVING ENVIRONMENT. To enable students to describe the relationship between the structure and functions of organisms, to assess how organisms interact with one another and the physical setting, and to make decisions that ensure a sustainable environment.

As a result of a successful science education, the learner will:

3.1. recognize and explain the similarities and differences among organisms in terms of structure, function, and behavior;

3.2. investigate and interpret the causes of diversity and similarity among existent and extinct organisms through time;

3.3. construct and interpret conceptual, physical, and mathematical models to explain how humans and other species are linked directly or indirectly with each other and in ecosystems; 3.4. investigate and explain how the interactions of psychological, biological, physiological, social, and cultural systems affect mental and physical well-being; and

3.5. evaluate how societal decisions about science and technology may impact the survival of various species.

GOAL 4. SOCIETAL PERSPECTIVES. To enable students to analyze the interactions of science, technology and society, in the past, present and future.

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As a result of a successful science education, the learner will:

4.1. recognize and respect that scientific inquiry and knowledge represent the accumulated work, over many centuries, of men and women in every part of the world;

4.2. identify and explain the significance of milestones that define the advancement of scientific inquiry and knowledge;

4.3. recognize and evaluate the impact of scientific inquiry and knowledge on human culture and how human culture impacts scientific inquiry and knowledge; and

4.4. contribute to the discourse relative to the scientific and technological priorities and their relationship to societal issues.

GOAL 5. **THEMATIC IDEAS. To enable students to use major scientific ideas to explore phenomena, inform their decisions, resolve issues, and solve problems; and to explain how things work.**

As a result of a successful science education, the learner will:

5.1. identify and explain systems, e.g. solar systems, ecosystems, organisms, and chemical and physical systems, by noting components and relationships;

5.2. use the concept of systems to organize seemingly isolated facts and observations into comprehendible explanations of how things work;

5.3. use conceptual, physical, and mathematical models as simplified representations to help explain and explore how things work or might work;

5.4. distinguish among and use the simplifying principles and aspects of systems, e.g. stability, equilibrium, conservation, and symmetry, that remain predictably constant to explore phenomena and make decisions;

5.5. distinguish among and apply patterns of change, including trends, cycles, evolution, and chaos, to explore phenomena and make decisions; and

1. 5.6. recognize and explain the implications of phenomena understood at various levels of complexity and scale.